

NorthEast Aerosol eXperiment (NEAX) - 2004



Department of Energy Atmospheric Science Program



PNNL Gulfstream 159

The DOE Atmospheric Science Program will participate in the Summer 2004 Intensive by conducting airborne measurements with the DOE G-1 instrumented aircraft and by providing an instrumented surface site, wind profilers, and other facilities.

Aircraft Measurements

***Particle Measurements:** Particle size distribution (3 nm - 1 μm); Proton transfer reaction mass spectrometry; Aerosol mass spectrometer, Aerosol light scattering coefficient (3 wavelengths), Particle absorption coefficient.*

***Trace gas measurements:** NO_y , NO_x , O_3 , SO_2 , CO , aldehydes, hydrocarbons and peroxides.*

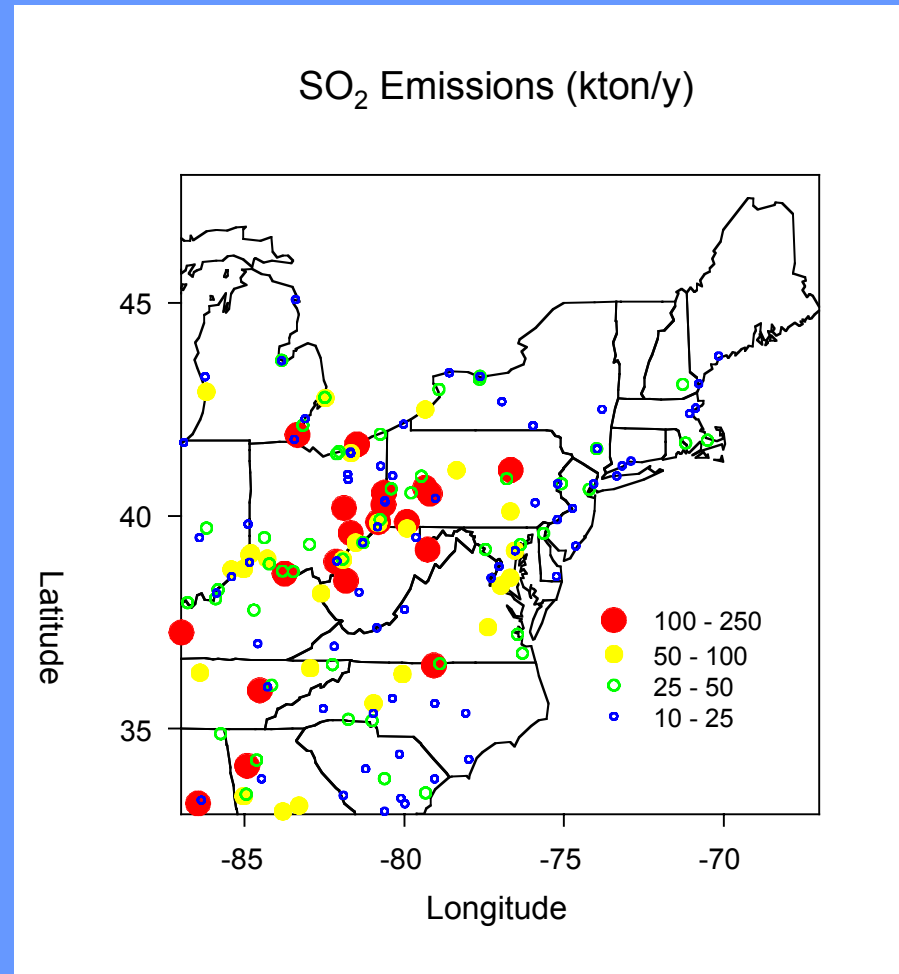
Base of Operations

Location-

Base of operations will be near Pittsburgh, PA because of proximity to the intense source region in the Ohio River Valley.

Schedule-

G-1 deployment will coincide with the NOAA deployment of the P-3, ~July 15 - August 15.



Surface Site

Location- East of Pittsburgh (within 100 miles)

Site to be set up by Pacific Northwest, Brookhaven, and Argonne National Labs, with possible participation by other ASP groups (universities, private research organizations and other federal agencies).

Ground site to include instruments that complement those onboard G-1

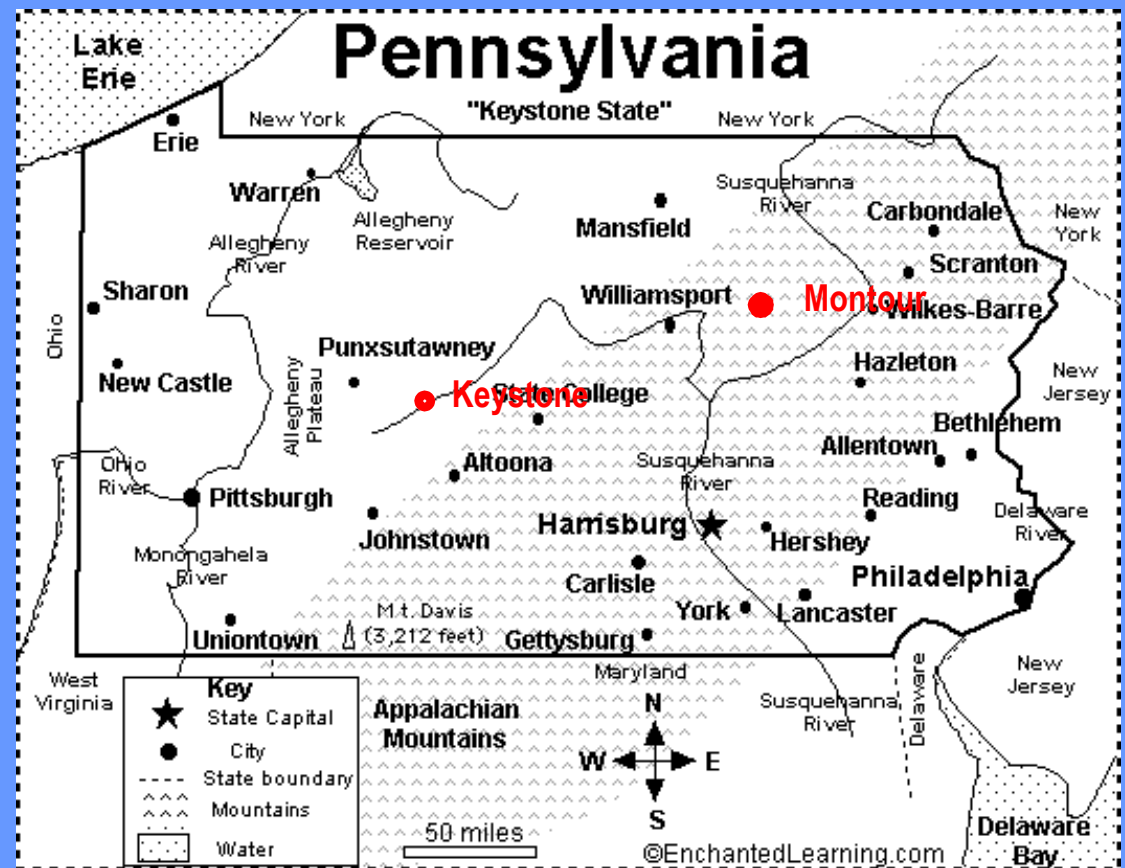
- Nephelometer and PSAP*
- Aerosol mass spectrometer: SPLAT II*
- Single Aerosol Collection System (EMSL)*
- Aerosol size (multiple DMA based instruments, 3.5nm to 700 nm).*
- radar wind profiler, afternoon ‘sonde launches*
- Aerosol lidar – PARSL*
- Broad band radiometers, MFRSR,*
- SO₂, NO_x, NO_y, CO, CH₂O...as available.*

ASP Objectives

Conduct process level studies of aerosol/oxidant formation with emphasis on aerosols.

Candidate plumes for process studies include-

Keystone power plant, separately, and in combination with the Pittsburgh plume; power plants with different emissions characteristics, e.g., Montour vs Keystone, etc.

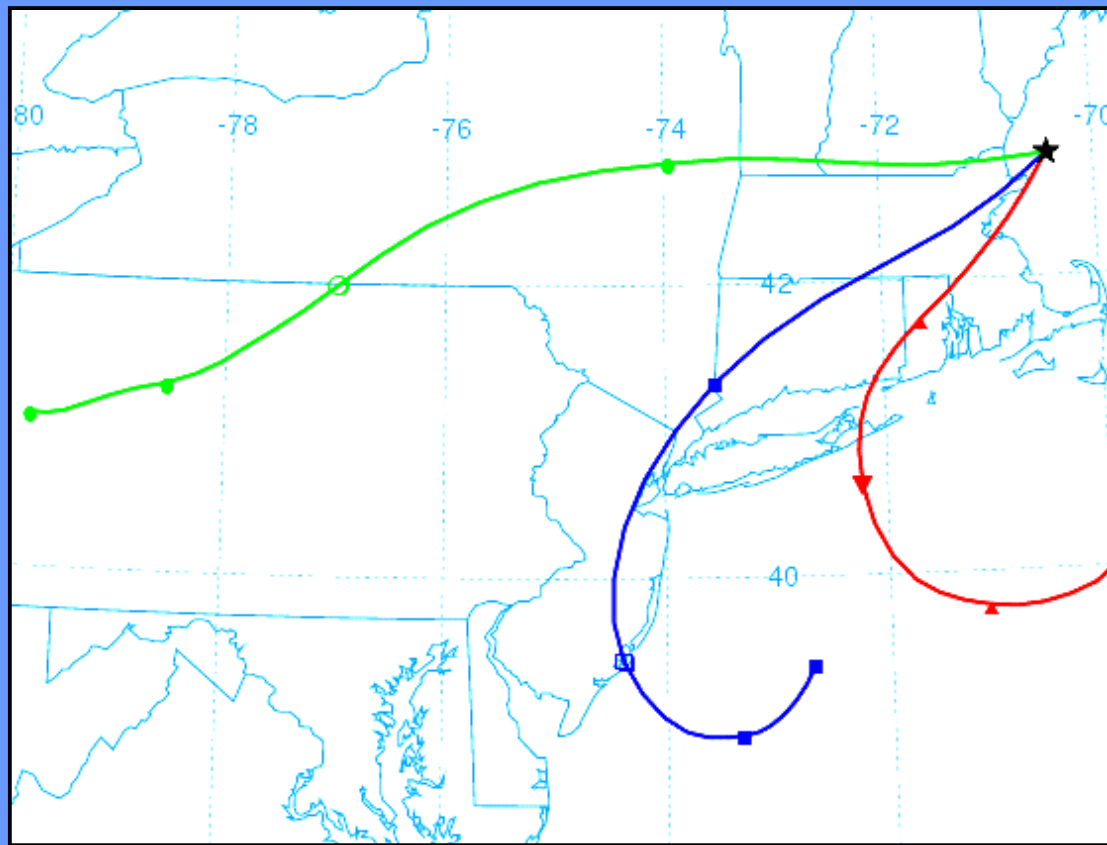


Process Questions

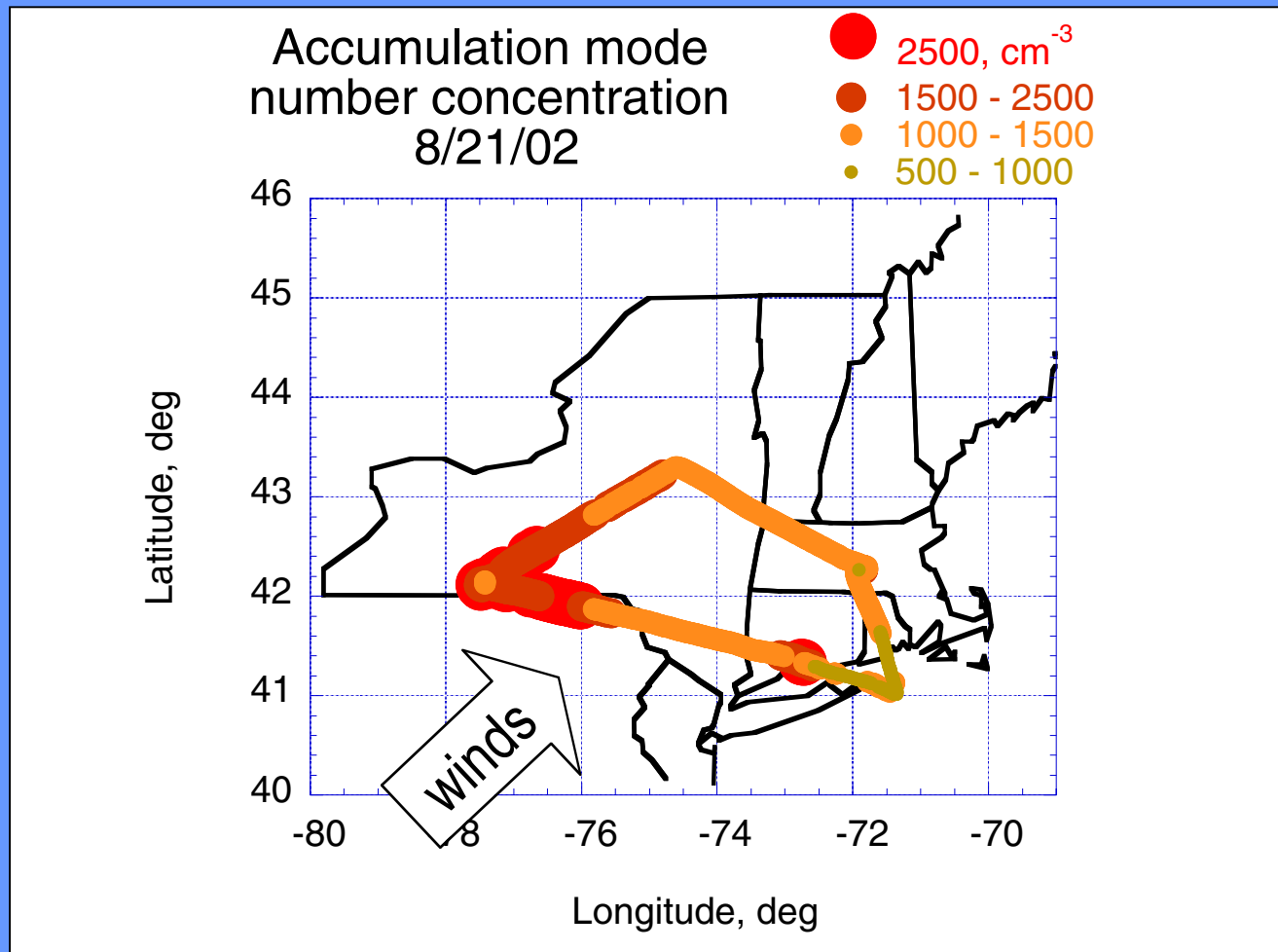
- How is the rate of mass accumulation by aerosols related to precursor concentrations and processing conditions?*
- What are the linkages between aerosol and oxidant formation in different kinds of plumes?*
- Does the aerosol mass accumulation rate depend on the aerosol/aerosol precursor source?*
- Are there differences in the hygroscopic properties of aerosols emanating from different types of sources. How do these hygroscopic properties change as the plume ages?*
- What is the role of biogenic hydrocarbons in determining the O_3 /aerosol burden?*

ASP Objectives

Characterize contribution of mid-western sources of aerosols and oxidants and their precursors to ozone/aerosol burdens of the northeastern US.



An example from the Summer 2002 Study



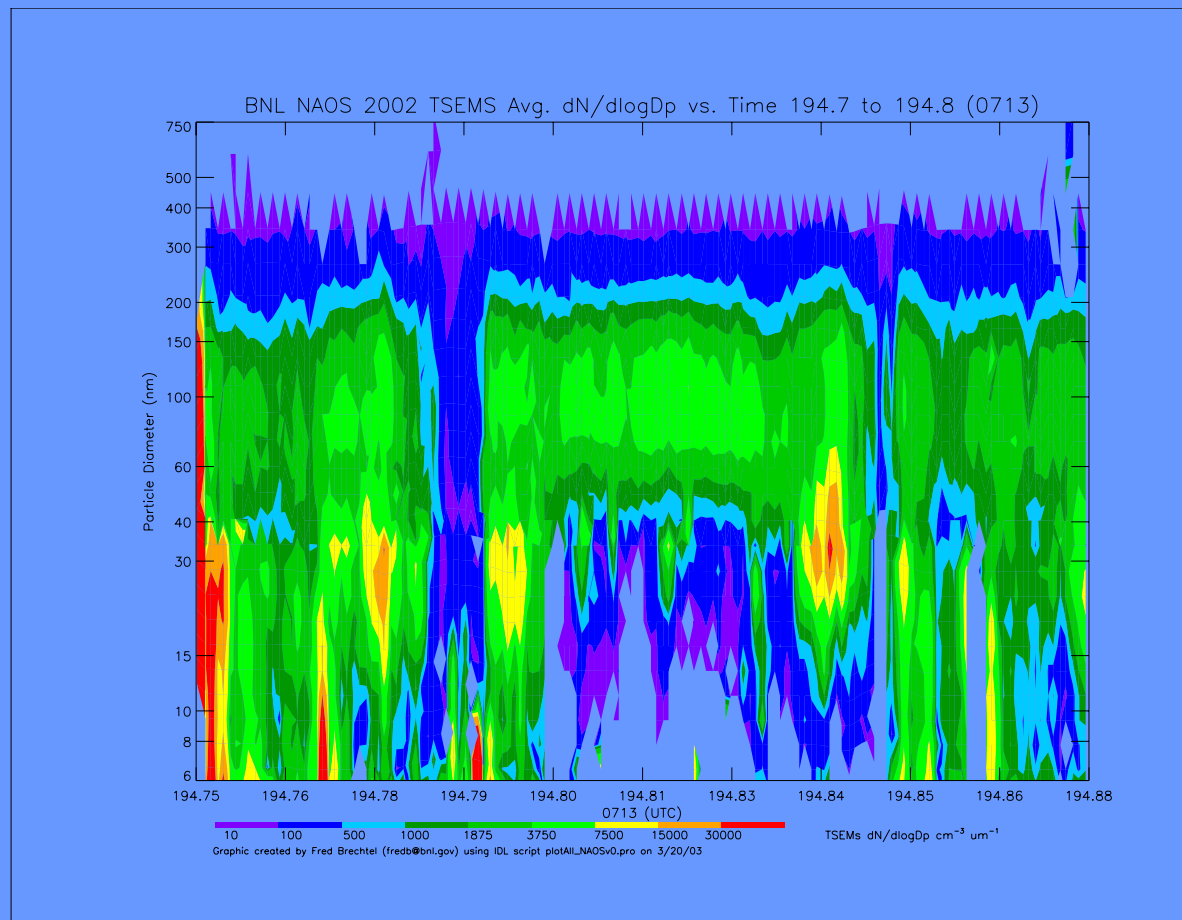
Broad region of high concentrations of aerosols and aerosol precursors obviously transported from source regions to the southwest.

Imbedded within the transport question are other questions such as-

- What is the relative importance of urban and power plant emissions on the amount of transported O_3 /aerosol?*
- How does this importance change as a function of meteorology?*
- What is the relationship between sources of aerosols/aerosol precursors and the vertical and horizontal distribution of aerosol in the atmosphere?*

ASP Objectives

Characterize regional differences in aerosol distribution/composition/microphysics in relation to aerosol sources and processing history.



Regional Scale Flight Plans

Example of a potential flight plan-

Flights will be conducted mid-boundary layer. Spirals to ~10 kft will be made routinely over one or more ground sites. Orientation of flight legs will be determined by prevailing meteorology.

